

## DRAWINGS ATTACHED

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(21) Application Nos. 42116/69 (22) Filed 23 Aug. 1969  
 37063/70 31 July 1970

(23) Complete Specification filed 20 Nov. 1970

(44) Complete Specification published 8 Aug. 1973

(51) International Classification B29D 3/00

(52) Index at acceptance  
 B5A 1R100 1R14A 1R14C2 1R20 1R48 1R55 1R86  
 C1H 6 E1

(19)



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## (54) IMPROVEMENTS IN THE MANUFACTURE OF MOULDED DECORATIVE MATERIAL AND SLABS OR TILES

(71) We, STENITE LIMITED, of 109 Cemetery Road, Darwen, Lancashire, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in manufacturing decorative material.

10 A method of manufacturing panels has been proposed in Specification No. 1,100,951 whereby a layer of pure, unfilled resin composition is first poured into the mould to form a skin which will give a good surface to the 15 facing element. To this is added a layer of the polyester resin composition filled with up to 75% of a finely ground calcium carbonate or clay filler.

It has also been proposed in Specification 20 No. 971,619 that a method of making imitation stone slabs in a mould comprises coating the inside surface of the bottom of the mould with a coat of synthetic thermosetting resinous material, placing stone chips on top 25 of the said coat when set, vibrating the mould to settle the chips so that they present a substantially flat surface, coating said surface with a layer of synthetic resinous material curing the synthetic thermosetting 30 resinous material, adding sufficient uncured concrete to fill the mould to the required slab thickness, vibrating the mould to remove air bubbles from the concrete, and curing the concrete.

35 According to the invention a method of manufacturing decorative material comprises bonding graded chippings or granules of predetermined size range of stone, glass or other material by means of a transparent settable synthetic resin matrix to a layer of transparent synthetic resin in the mould, said layer having been previously disposed in the mould and being set such that, when the chippings are added said chippings cannot 40 pass through the layer, and after the chippings and bonding resin have been added to

the mould, allowing the mass to set or harden. The resin layer first applied to the mould can be a resin gel which is then allowed to harden or at least attain such a highly viscous state that the chippings, when added to the mould, cannot pass through the layer. The added chippings may, for example, be of granite, marble, coal, glass or other material, and then liquid resin is poured into the mould to surround them and bond them to the resin layer. After the whole has hardened, the article which may be in the form of a block, slab, tile or more intricately shaped article according to the shape of the mould is removed therefrom.

50 The resin used for the layer and to bond the chippings thereto can be polyester resin with catalyst and accelerator added thereto, and preferably the resin used is colourless or 55 water clear.

55 If the surface of the mould to which the resin layer is first applied is smooth, and preferably firm, the corresponding surface of the moulded article is smooth and of highly polished or glazed appearance. Consequently when the chipping are of stone and the same size as the natural grain of the stone the articles has the appearance of polished stone. By ensuring that the chippings cannot pass through the first layer to the outer surface thereof prevents this surface having a dull and uneven appearance unless the surface of the mould is deliberately shaped to give the article such an appearance.

70 In slab or tile form the moulded article may be used for flooring or for cladding buildings and walls. If the material is moulded as blocks these may be used as kerbing around graves and for headstones or memorials, which may be moulded to shape and inscriptions may be carved, sandblasted, or moulded thereon. Also the material can be moulded into other shapes, for example 75 vases, urns, statues.

80 If desired the surface layer of resin may 85

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be removed, for example, by sandblasting after moulding to uncover the surfaces of the chippings.

For extra decorative effect coloured pigment may be added to either the resin used for the first layer and/or to the resin used for bonding the chippings to the layer. In addition to the pigment or as an alternative thereto, coloured flakes or grains of smaller size than the chippings may be added to the resin bonding the chippings to the first layer. The coloured flakes or grains are preferably "metallic jewels" which are glittering coloured flakes of lacquered aluminium foil coated with epoxy resin. When such additives are used the material is more suitable for moulding into slabs or tiles for use, for example, as bar or table tops or moulded into more intricate shapes, for example ice buckets, lamps bases, or bases for table lighters.

The invention will now be further described with reference to the accompanying drawings in which:—

Fig. 1 is a cross-sectional view of a mould and material being moulded therein according to the invention to form a slab or tile;

Fig. 2 is a cross-sectional view of a mould for moulding a curved shaped article from material formed according to the invention; and

Figs. 3 and 4 are fragmentary perspective and cross-sectional views of slabs or tiles of material formed according to the invention.

Referring to Fig. 1, a mould is shown at 2 for moulding tiles or slabs. Preferably the mould has smooth internal faces and is formed of a firm or hard material. The mould may be formed from a fibre glass material or from a metal, for example aluminium, in both of which cases the inner faces of the mould should be coated with a suitable release agent such as a silicone wax. But preferably the mould can be formed from a hard blend of a silicone rubber with a polyurethane rubber in which case no release agent need be used. Also moulds of polyurethane material can be manufactured relatively cheaply and in mass production by rubber moulding techniques. If the slab or tiles to be moulded in the mould 2 are to have a face which appears particularly smooth or highly finished it is preferred to provide a sheet 4 of a hard polished material, for example a plastic material such as sold under the Trade Mark *Formica* as the base of the mould. The sheet 4 is preferably coated with a release agent.

Any suitable translucent synthetic resin may be used as the decorative material but we prefer to use polyester resin of a colour known as "clear". A first amount of resin is mixed with a small amount of catalyst and accelerator so that the resin gel and harden relatively quickly. Let the

resin is in gel form it is applied to the sheet 4 as a relatively thin layer 6. Then the gel layer 6 is allowed to harden. The layer 6 can be of any desired thickness but we have found a layer of about  $\frac{1}{16}$  inch gives an excellent end result. After layer 6 has set a layer of chippings 8 of any suitable material according to the decorative effect it is desired to achieve is layed to a desired depth on top of resin layer 6, then liquid resin mixed with an accelerator and catalyst is poured into the mould and permeates through the spaces between the chippings to form a backing layer or matrix 10 surrounding the chippings and bonding them to the layer 6 when the resin matrix is allowed to harden.

After the whole mass has set, the slab or tile is removed from the mould.

The polyester resin we prefer to use for the matrix layer 10 is available under the Registered Trade Mark "Polymaster 1209" from W. A. Mitchell & Smith Ltd., Mitcham, Surrey and the layer 6 may also be "Polymaster 1209" or that available under the Registered Trade Mark "Iso Polymaster 125 T/G". The catalyst may be liquid Methyl Ethyl Ketone Peroxide in a plasticiser and the accelerator may be cobalt naphthenate in white spirit.

The chippings 8 may be of any material but if a stone effect is desired then chippings of stone, for example granite or marble are particularly suitable. The chippings may be of any suitable size but to achieve a better realistic appearance of polished stone for the moulded article, we have found that chippings which pass through a sieve of  $\frac{1}{16}$  inch mesh but are retained by a sieve of  $\frac{1}{32}$  inch mesh are preferable. Granite chippings can also be particularly effective in giving the article the appearance of a polished piece of solid granite. For other decorative effects, graded chipping of glass or coal or mixtures of materials may be used.

The moulding of the material is preferably carried out at a temperature in the range of about  $65^{\circ}\text{F}$  to  $80^{\circ}\text{F}$  and this temperature may be raised ten or so degrees during the final curing in the mould.

The mould 2 in Fig. 2 is an example of a mould for moulding more intricately shaped articles. In this case resin layer 6 comprises a thin layer 6a applied to the mould, 120 by a brush. Layer 6a is allowed to harden. Another thin gel layer 6b is applied and allowed to harden. Layer 6 again has a thickness of about  $\frac{1}{16}$  inch. Then the chippings and resin matrix are added.

For further decorative effect coloured resin may be used. This can be achieved by mixing suitable colouring matter or pigment

with the resin. If pigment is added to the liquid resin for the matrix layer 10 it is preferred to add the accelerator, then the coloring and then the catalyst.

5. For a further decorative effect, whether the resin is coloured or not, coloured flakes or grains of smaller size than the chippings may be mixed into the liquid resin for the matrix before the accelerator is added and the liquid poured over the chippings. These flakes or grains may be of metal and may be a material known as "metallic jewels," which are coloured glittering flakes of lacquered aluminium coated with epoxy resin, such as sold by Croxton & Garry Ltd. of Esher, Surrey or by Meadowbrook Inventions Inc. of New Jersey, U.S.A. We prefer to use metallic jewels of about 0.015 inch  $\times$  0.008 inch flake size though other sizes may be used if desired. The proportion of metallic jewels to resin can be varied as desired but  $\frac{1}{2}$  ounce of metallic jewels in each pound of resin is suitable.

In Fig. 4 metallic jewels are shown at 12 between chippings 8 in the matrix 10.

The surfaces of the mould can be shaped to reproduce any desired pattern, motif, inscription or the like in surfaces of the moulded article. Should it be desired for the articles to have an uneven, crackled or frosty appearance the mould face can be shaped to achieve this. If it is desired that the article should have a cracked or frosty appearance but retain the smoothness of the layer 6, this can be achieved by adding about 2% by volume of water to the liquid polyester resin which is then poured over the chippings as the matrix layer 10 in a hot mould at a temperature of about 100°F.

40. If desired, the polyester resin in gel form for the layer 6 may be replaced by a film of polyester resin which is already hardened or set. This film can be laid in the mould and/or applied to sides thereof and then the chippings and liquid resin added. The resin film may be mounted by adhesion on a backing sheet of, for example, paper or textile material and stored in the form of a roll. After the moulding operation, the backing sheet can be peeled off leaving the film bonded to the matrix.

50. **WHAT WE CLAIM IS:—**

1. A method of making and moulding decorative material comprising bonding graded chippings or granules of predetermined size range of stone, glass or other material by means of a transparent, settable synthetic resin matrix to a layer of transparent synthetic resin in a mould, said layer having been previously disposed in the mould and being set such that when the chippings are added said chippings cannot pass through the layer; and after the chippings and bonding resin have been added to the mould, allowing the mass to set or harden.
2. A method of making and moulding decorative material comprising providing a layer of transparent synthetic resin against one or more inner surfaces of a mould by introducing the resin as a settable gel into the mould and allowing the resin to harden, thereafter adding graded chippings or granules of predetermined size range of stone, glass or other material into the mould, and then bonding the chippings to the layer by means of a settable, transparent liquid synthetic resin matrix which is introduced into the mould and allowed to harden or set.
3. A method as claimed in Claim 1 or Claim 2 in which polyester resin is used for the layer and matrix.
4. A method as claimed in any one preceding Claims in which granite chippings are used.
5. A method as claimed in any one of Claims 1 to 3 in which marble chippings are used.
6. A method as claimed in any one preceding claim in which colouring matter or pigment is added to the liquid resin matrix before the latter is introduced into the mould.
7. A method as claimed in any one preceding claim in which coloured grains or flakes of smaller size than the chippings are disposed in the resin matrix.
8. A method as claimed in Claim 7 in which the grains or flakes are added to the liquid matrix before the latter is introduced into the mould.
9. A method as claimed in Claim 7 or Claim 8 in which the grains or flakes are of metal.
10. A method as claimed in any one of Claims 7 to 9 in which the grains or flakes are the hereinbefore defined "metallic jewels".
11. A method as claimed in any one preceding claim in which the synthetic resin starting material is colourless or water clear.
12. A method as claimed in any one preceding claim in which the resin layer is applied against a mould surface which is smooth and polished.
13. A method as claimed in any one preceding claim in which water is added to the liquid resin for the matrix.
14. A method as claimed in Claim 12 in which the amount of added water is about 2% by volume.
15. A method as claimed in Claim 13 in which the mould is heated to about 100°F.
16. An article comprising chippings of stone, glass or other materials disposed in a transparent synthetic resin matrix bonding the chippings to a layer of transparent synthetic resin, and said layer containing no chippings.
17. A method of making and moulding

with the resin. If pigment is added to the decorative material substantially as hereinbefore described with reference to the accompanying drawing.

5 18. A moulded article when made by

the method claimed in any one of Claims 1 to 14 or 17.

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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1973.  
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY  
from which copies may be obtained.

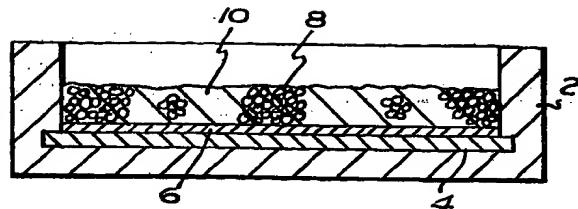


FIG. 1

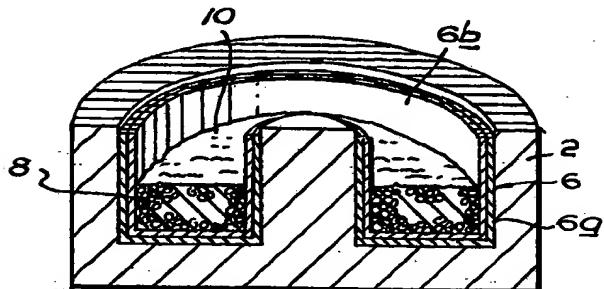


FIG. 2

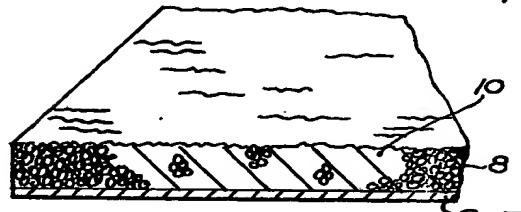


FIG. 3

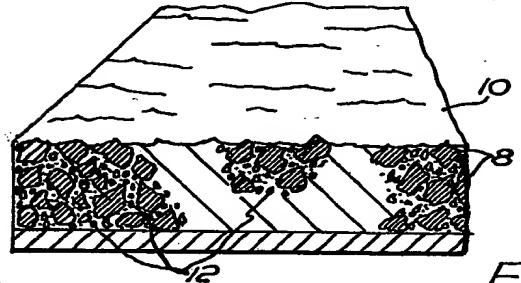


FIG. 4